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Appendix I: The Computation of Indexes
Author(s): Robert Cooley Angell
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APPENDIX I

THE COMPUTATION OF INDEXES

A. THE WELFARE EFFORT INDEX (FIRST STUDY)

This index was based upon the data available in two tables in the United States Children's Bureau publication, *The Community Welfare Picture as Reflected in Health and Welfare Statistics in 29 Urban Areas, 1938*. From Table 8, "Percentage Distribution of Expenditures by Sources of Funds and Urban Areas," I obtained for each city a figure that I termed the "Percentage Local." This was a summation of percentages derived from local public funds, private contributions, and income from endowments. From Table 9, "Per Capita Expenditures by Sources of Funds and by Urban Areas," I obtained the "Per Capita Local" figure for each city. It sums the percentages from the same three sources. The Percentage Local and Per Capita Local scores for each of the twenty-eight cities are given in Table I. (Washington, D.C., had to be omitted because local public funds could not be separated from federal funds.)

TABLE I

PER CAPITA LOCAL EXPENDITURES FOR WELFARE, PERCENTAGE LOCAL, AND WELFARE EFFORT SCORES FOR TWENTY-EIGHT URBAN AREAS, 1938

Area	Per Capita Local	Percentage Local	Welfare Effort Index
Buffalo	18.95	41.8	266.7
Syracuse	18.81	39.4	235.6
Springfield (Mass.)	19.19	39.9	233.5
Milwaukee	18.75	33.2	199.5
Cincinnati	16.91	36.5	191.5
Baltimore	11.12	40.1	166.1
Richmond (Va.)	11.41	46.4	153.6
Providence	13.56	29.1	148.2
Hartford	15.02	32.7	139.0
Indianapolis	12.44	25.9	132.0
Cleveland	13.68	20.2	131.2
Los Angeles	14.05	31.1	115.5
Louisville	8.14	31.9	111.6
Canton	9.12	21.9	105.0
San Francisco	15.24	26.2	101.7
Bridgeport	10.45	27.6	101.4
Dayton	9.46	20.2	93.2
St. Louis	9.24	21.9	89.9
Kansas City (Mo.)	9.94	24.1	83.3
Columbus (Ohio)	8.01	18.1	72.2
New Orleans	5.41	12.9	71.7
Grand Rapids	6.37	13.2	65.7
Wichita	7.34	24.0	65.2
Atlanta	6.73	18.6	63.5
Houston	6.21	28.3	63.5
Birmingham	3.45	14.1	62.8
Dallas	5.84	23.6	50.7
Wilkes-Barre	4.13	6.7	50.6
Mean, 28 areas	11.04	26.8	114.6

The scores on the Welfare Effort Index, also shown in Table I, were computed in the following manner: First, the Per Capita Local expenditure was corrected for level of living by using as a divisor an index worked out by the Children's Bureau for each of the urban areas. Second, the Per Capita Local figure as corrected was multiplied by a fraction whose numerator was the average of the percentages of expenditures that derived from nonlocal sources for all areas and whose denominator was the percentage of expenditures deriving from nonlocal sources for the particular area. Finally, all products were multiplied by 10.

B. THE CRIME INDEX (FIRST AND SECOND STUDIES)

In the two statistical studies the Crime Index was computed in almost the same manner. The chief difference was that in the first a five-year summation of crimes was taken, and in the second a three-year *average*. The data were drawn from the *Uniform Crime Reports* published by the Federal Bureau of Investigation. Consultation with criminologists and a study of the Bureau's own *Ten Years of Uniform Crime Reporting, 1930–1939* convinced me that murder and nonnegligent manslaughter, robbery, and burglary were the three most reliable categories for my purpose. The five-year totals for each of the twenty-eight cities in the first study for each of these types of crime are given in Table II.

The crime scores were computed as follows: First, standard yearly frequencies per 100,000

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population were established for cities between 100,000 and 1,000,000. These proved to be 6.51 for murder and nonnegligent manslaughter, 65.58 for robbery, and 390.90 for burglary. Second, the standard burglary frequency was then divided by each of the other two and the square roots of the two quotients taken. These square roots, 7.75 and 2.44, respectively, were

TABLE II

NUMBER OF CRIMES IN SPECIFIED CATEGORIES JANUARY 1, 1936, TO DECEMBER 31, 1940, AND CRIME SCORES FOR TWENTY-EIGHT CITIES

City	Murder and Non-negligent Man-slaughter	Robbery	Burglary	Crime Index
Milwaukee	47	252	2,670	6.22
Buffalo	70	453	3,371	9.14
Providence	16	85	2,259	10.20
Syracuse	10	118	2,105	11.99
Wilkes-Barre	4	111	918	14 18
Springfield (Mass.)	6	63	2,019	14.79
New Orleans	366	678	2,968	15.07
Bridgeport	27	129	2,026	17.35
Wichita	17	95	1,861	19 34
St. Louis	321	2,420	7,483	19.46
Grand Rapids	10	190	3,022	21.73
Baltimore	347	3,127	10,663	24.43
Dayton	95	558	3,419	26.15
Hartford	17	106	4,122	27.18
San Francisco	115	2,813	11,174	29.81
Canton	16	533	2,130	32.91
Cleveland	348	5,684	13,106	33.79
Kansas City (Mo.)	199	2,495	6,462	35.32
Houston	340	1,486	9,865	41.89
Cincinnati	257	2,687	10,711	42.23
Los Angeles	393	8,169	42,229	43.36
Dallas	347	902	8,638	45.86
Indianapolis	178	2,379	11,353	47.90
Birmingham	363	835	8,158	48.54
Richmond (Va.)	181	1,026	6,565	54 25
Columbus (Ohio)	80	2,075	11,311	55 54
Louisville	202	2,017	12,600	59 83
Atlanta	524	2,442	13,373	77 46

used as factors by which to multiply the number of homicides and robberies for each city before combining them with the burglaries by addition. The effect of this complicated operation was to give the crimes in the three categories weights proportional to the square roots of their frequencies. One homicide equals, not one burglary, but 7.75 burglaries. This seemed a justifiable procedure, since it appeared to be better than weighting one homicide as equal to one burglary or than weighting all homicides as equal to all burglaries. Finally, the sums of the three categories as thus manipulated were divided by the 1940 population of each city in thousands to give the crime scores that are recorded in the last column of Table II. In the second study the procedure was the same except that a yearly average was obtained and this average was divided, not by the total population, but by the population over fifteen years of age. Few crimes are committed by those younger than fifteen.

C. RATES AND INDEXES DERIVED FROM THORNDIKE'S DATA (FIRST STUDY)

The fourteen items used in Tables 3 and 4 in chapter ii were derived from the data supplied by Dr. Thorndike. Five were directly transcribed from his data: the percentage that secondhand-store sales are of all retail sales, the percentage that chain-store sales are of retail sales, the births per 1,000 females aged 20–44, the median size of the family, and the percentage of homes owned by the occupants. Three represent his figures divided by the 1930 population: homicides per 10,000 population, suicides per 10,000 population, and illegitimate births per 10,000 population. Three represent his figures divided by the per capita sales of all retail stores: indexes of efforts to support schools, recreation, and libraries and museums. The deaths from syphilis and gonococcus infections were given in Thorndike's data separately. I combined them and divided the sum by the population fifteen years of age and over. The public funds expended on sanitation, health, and public safety were given separately by Thorndike. I combined them and divided by the total retail sales.

D. THE WELFARE EFFORT INDEX (SECOND STUDY)

This index was computed from data kindly supplied by Community Chests and Councils, Inc. In the second statistical study the data for 1940 were used. When I wished to check the rating of the four cities in which survey research was carried on after the war, I obtained the 1947 figures and computed the index in the same manner as before.

The cards of Community Chests and Councils, Inc., show the population covered by the campaign in each city, the quota assigned, the amount raised, and the number of persons making pledges. From these data the following formula was constructed to give a welfare effort score:

$$\frac{\text{Amount raised}}{\text{Quota}} + \frac{\text{Pledgers}}{\text{No. of families in the area}} + \frac{\text{Amount raised}}{.0033 \times \text{Yearly retail sales}}$$

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Each of the three ratios fluctuates around unity, so that the scores fluctuated around 3.0. It was thought that each of the three ratios measures one aspect of welfare effort—degree of achievement of goal, proportion of families giving, and economic sacrifice involved.

E. THE INTEGRATION INDEX

The Integration Index used in the second statistical study was computed by using the Crime Index and the Welfare Effort Index of that study. To determine whether they should be weighted equally or in some other manner, each of these two was correlated with the two causal factors which had already emerged as important—mobility and heterogeneity. The coefficients of correlation were: crime with mobility +.45; crime with heterogeneity +.58; welfare effort with mobility −.57; and welfare effort with heterogeneity −.20. The average correlation of crime with these two factors was +.51 and of welfare effort −.38. Since the real significance of a correlation coefficient is revealed by its square, and since the squares in this case were .26 and .14, I decided to weight crime twice as much as welfare effort in computing the Integration Index.

The Crime Index and the Welfare Effort Index were combined in the following manner: The crime scores were reversed by subtracting them from 20 (they ran originally from 1.6 for Milwaukee to 17.5 for Atlanta). This was done in order to make the high values indicate strong integration. The variates of the Welfare Effort Index were then translated into a distribution having the same mean and standard deviation as the crime series by the formula

$$x_1 = M_1 + \frac{\sigma_1}{\sigma_2} x_2 - M_2$$

given by Karl Holzinger in *Statistical Methods for Students of Education*, page 121; the crime variates were multiplied by 2 in order to give them double weight in the final integration score; the two scores for each city were added; and the sums were divided by 3 to bring the integration scores back to a series having the same mean and standard deviation as the constituent series.

F. INDEXES IN THE SURVEY RESEARCH

In the tables dealing with the survey research some of the figures are percentages, but most of them are indexes. The great majority of these indexes are derived from three- or five-step codes. In the former case the number of respondents falling in the high or "good" category was multiplied by 5, in the middle category by 3, and in the low category by 1. In the five-step case the numbers in the various categories were multiplied, respectively, by 5, 4, 3, 2, or 1. In both cases these moments were then added and the sum was divided by the total number of respondents. Thus, these indexes are weighted averages.

Occasionally the term "special index" appears in the tables. The need for this type of index arises from the fact that several of the questions in both cross-section and leader interviews resulted in multiple answers. The question asked of the leaders, "How did you first get started in taking an active part in community affairs?" will serve as an example. Respondents often gave more than one answer. For instance, a leader might lay great stress on the fact that community leadership was a tradition in his family, but he might also mention that friends influenced him and that business reasons played a part. In such a case the coder recorded the reasons in the order of their importance. According to the general run of the answers to specific questions, it was decided how many answers for any one respondent would be coded. Sometimes the maximum was two, usually it was three, and once or twice it was four. The usual situation was that the number of answers dropped away very rapidly after the first one. For instance, if in one of the cross-sections 100 respondents gave a first reason why they liked their city, perhaps only 50 would give a second, and only 10 a third. This raises a difficulty for computing an index. In such a case it would obviously be inappropriate to give equal weights to first and third answers, since, if this were done, an individual who gave three answers would have three times the weight of an individual who gave only one. On the other hand, to deal only with the first answers would also be a distortion, because some reason of importance might appear hardly at all as a first answer but frequently as a second.

This problem was met in the following manner: The percentage of all respondents giving a specified first answer was computed and multiplied by 4. For instance, if 33 persons among 100 respondents gave as their primary reason for liking the city that it was friendly, then

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132 points were scored for this fact. If 15 more gave this as a second reason, this was multiplied by 2 and 30 points was added to the 132. If 8 gave it as a third reason, this were multiplied by 1 and the 8 points were added. Finally, if fourth reasons were being used, and 4 gave friendliness as their fourth reason for liking the city, this was multiplied by $\frac{1}{2}$ and the 2 points added. Thus, an index figure of 172 would be reached.

The maximum score on any such special index item is 400—the result if all the respondents gave the same answer as the most important reason for them. The maximum possible sum of all the scores assigned on such a question to different reasons varies with the number of answers by any one respondent that are coded: if two, the maximum sum is 600; if three, 700; if four, 750.

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